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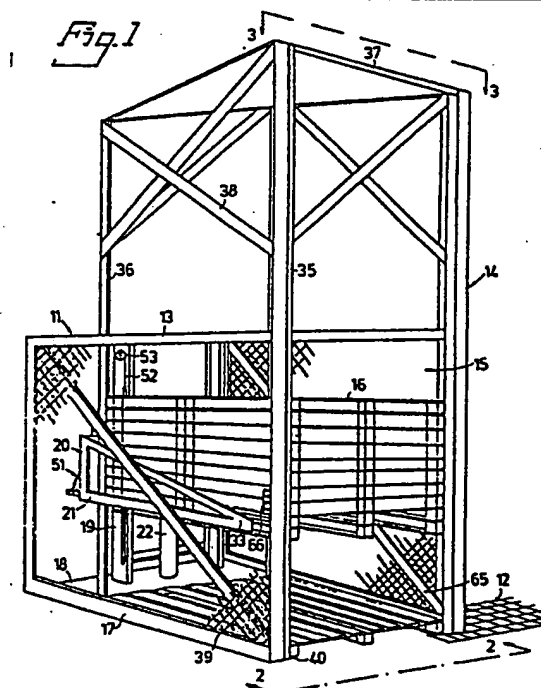
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(54) A method and magazine for storing and handling pallets.

(57) A magazine arranged for the temporary storage of pallets, for example within an industrial locale. The magazine includes a supporting frame-structure (11) having an internal free space (15) for receiving and storing superposed (16). For the purpose of handling the pallets in the magazine, there is provided a U-shaped lifting carriage (21) which can be moved vertically along guides (24) in the supporting frame-structure. Mounted on the lifting carriage are pivotable lifting forks (45), which can be swung between a gripping position and a release position. A guide means (51) is arranged to positively guide the lifting forks (45) into their release position, when the lifting carriage (21) occupies its bottom position.

A method for storing and handling pallets in which the pallets are introduced into a magazine according to the above in batches while lying horizontally one upon the other. Prior to introducing each further batch, the pallets present in the magazine are lifted with the aid of the lifting carriage (21), so that the further pallet batch has room beneath the raised pallets. The lifting carriage is then lowered to its bottom position, whereupon all pallets will rest on the lowermost pallet. The pallets are removed from the magazine successively, beginning from the lowermost pallet, all the remaining pallets resting on the aforesaid lowermost pallet being lifted with the aid of the lifting carriage.



A METHOD AND MAGAZINE FOR STORING AND HANDLING PALLETS

The present invention relates to a method for storing and handling pallets, and also to a magazine with which the method is carried out.

- 5 The majority of working activities in which material handling forms an essential part normally include the use of pallets, to facilitate the handling and transportation of goods, particularly heavy goods. Such handling and transportation may concern the delivery of goods on pallets, or the internal processing
10 or treatment of goods, with the goods raised on pallets. Prior to being used, the empty pallets are normally stacked, one upon the other, at one or more storage locations within the working area. The pallets are distributed one at a time, normally by lifting the uppermost pallet manually from a pallet stack and
15 placing it onto a pallet trolley. The pallets normally used are known as EUR-pallets and are approximately 25 kg in weight. It will be readily seen that manual lifting of such pallets should be avoided. In addition, the floor space occupied by such a stack is not utilized to the full, since the height
20 of the stack must be such as to enable the uppermost pallet to be reached and lifted down manually.

Known mechanical systems for the handling of empty pallets are unable to solve the aforementioned problem, since these systems
25 have been devised solely for pallets which are to move on roller conveyors. According to one such known system, fresh pallets are fed-in by placing said pallets above those pallets already found in the magazine. The pallets can only be discharged from the magazine one at a time, with the aid of
30 mechanical devices located by the sides of the pallets and beneath the same. The pallets are fed from the magazine onto a roller table, which also forms the bottom of the magazine. Such systems cannot be used together with conventional low-lift pallet trolleys, without using separate lifting arrange-
35 ments or high-lift trucks.

One object of the present invention is to provide a method for mechanically storing and handling pallets in which the afore-mentioned disadvantages are avoided and in which there is provided a rational pallet handling system with a good
5 working environment. A further object is to provide a magazine with which the method can be carried out. These objects, together with further objects of and advantages afforded by the invention will be apparent from the following description. The objects of the invention are realized by the present inven-
10 tion, the characterizing features of which are set forth in the following claims.

The invention will now be described in more detail with reference to the accompanying drawings, in which

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Figure 1 is a perspective view of a magazine according to the invention;

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Figure 2 is a view seen from the front in accordance with the arrows 2-2 in Figure 1;

Figure 3 is a view from the top in accordance with the arrows 3-3 in Figure 1;

25 Figures 4 and 5 illustrate in detail a lifting arm having gripping means shown in different positions; and

Figures 6 - 11 illustrate the magazine of Figure 1 schematically and in side view, and also illustrate the
30 method of feeding pallets into or out of the magazine.

In the illustrated embodiment, the magazine comprises a support-frame-structure 11, which is placed on a support surface 12, for example the floor of a workshop. The frame
35 structure comprises a plurality of beams 13, which are welded together to form a high-rise magazine body 14. Within the body 14 there is provided a free space 15 for receiving and storing pallets 16. A bed plate 18 is fixedly attached to

the bottom part 17 of the supporting-frame structure.
Arranged on the bed plate 18 is a frame 19 for accommodating a lifting arrangement 20, which incorporates a lifting carriage 21 and a hydraulic lift cylinder 22, said cylinder being placed
5 on the bed plate 18. The frame is secured to the rear cross-beams 23 of the supporting-frame structure and includes two guide rails 24 for receiving rollers 25 located on the lifting carriage 21. Mounted on the piston rod 26 of the cylinder 22 is a yoke 27 having two symmetrically arranged sprocket wheels 28.
10 Extending over the sprocket wheels 28 are respective chains 29, said chains being located between the backpiece 30 of the lifting carriage and a rear cross beam 31 of the frame 19, such that the carriage is lifted with the aid of the chains 29 when the piston rod 26 is extended in the manner illustrated to the
15 right of Figure 2. During this lifting movement, the lifting carriage is guided by the rollers 25, said rollers being journaled in respective brackets 32 mounted on the backpiece 30. Extending at right angles from respective ends of the backpiece are two lifting arms 33, the lifting carriage 21
20 obtaining a substantially U-shape.

The free space 15 for accommodating the pallets 16 is defined by front and back guide plates or guide rails 35 and 36 respectively. The guide rails 35, 36 extend from the bottom
25 part 17, up to the roof 37 of the magazine and the upper parts of said rails are stiffened by means of side struts 38. A protection net 39 covers the long sides of the lower part of the magazine. The rear side of the magazine may also be covered with a protecting net, if so desired. Two mutually
30 parallel support beams 40 are arranged in the bottom part of the magazine, to form the bottom 41 of the magazine, said bottom being suitably spaced from the support surface 12. The beams 40 are welded to the forward guide rails 35 and to the bed plate 18 respectively.

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On each of the lifting arms 33 there is arranged a gripping means having the form of two, pivotable lifting forks 45, c.f. Figure 4. The lifting forks are permanently mounted on a

rotatable rod 46, which is guided by tubular sleeves 47 so as to rotate about an axis 48, parallel with the lifting arm 33. Each lifting fork 45 comprises a metal plate 49, which is excentrically mounted on the rod 46, such that the rear edge 50 of the plate abuts the lifting arm 33 in the downwardly swung gripping position of the lifting fork, as shown in Figure 5. The lifting forks can be swung upwardly from said position through an angle of approximately 90° , c.f. Figure 4. A guide means, generally referenced 51, is allocated to the lifting forks 45 on each lifting arm 33, so as to swing said forks upwardly to the release position illustrated in Figure 4, at a given height of the lifting carriage 21. Each of the guide means 51 includes a line 52, which extends over a line guide having the form of a wheel 53 and mounted on the frame 19. One end 54 of the line is attached to a spring 55 mounted on the outer end of a lever 56, which is fixedly connected to the rod 46. The other end 57 of said line is attached to a counterweight 58, which is guided in a guide tube 59 having an end stop 60. The length of the line is adjusted so that the counterweight 58 contacts the end stop or line stop 60 when the lifting carriage 21 sinks to a previously selected distance from the magazine bottom 41. When the lifting carriage sinks below this preselected position, the line will cause the lifting forks to swing upwardly, with the aid of the lever 56. This position is suitably taken when the lifting carriage is located slightly above its lower terminal position. When the counterweight reaches the end stop 60, the spring 55 permits the lifting carriage to sink further, with the lifting forks still in their upwardly lifted position. The spring end 54 of the line can be stopped at mutually different heights, by vertically displacing the guide tube 59, thereby enabling the position at which the lifting forks are pivoted to be changed. Alternatively the line can be provided with a lock ring capable of being locked in different positions along said line and co-acting with a stop shoulder arranged on said frame to stop the movement of said line.

The magazine, which is arranged for the receipt, storage and

removal of pallets, has the following mode of operation; when one or more pallets are to be introduced into the magazine, said pallets are suitably lifted on a pallet trolley 64 or like device, and the trolley is moved into a lower receiving part 65 of the free space 15, so that the pallets occupy the position illustrated in chain lines in Figure 3. This can be effected without obstruction from the lifting forks 45, since said forks occupy their upwardly swung position when the lifting carriage 21 occupies its bottom position, see the left hand side of Figure 2. When the operator starts the lifting arrangement 20, by pressing an operating button 66, the lifting carriage begins to rise vertically from said bottom position. As the carriage is raised, the load on the line 52 progressively decreases, as a result of the compression or contraction of the spring 55. When the spring is fully compressed, further raising of the lifting carriage causes the lifting forks, under the influence of their own weight and due to their excentric mounting on the rod 46, to begin to rotate outwardly towards the pallets. In the case of EUR-pallets, the line stop 60 is suitably positioned so that the lifting forks 45 swing into the space 67 between the deck planks 68 and the bottom planks 69 of the lowermost pallet, which is still held lifted by the pallet trolley 64. Because the pivoting movement of the lifting forks takes place while the lifting carriage continues along its vertical movement, the forks are able to swing in to the narrow space 67, without the points of the forks damaging the deck or bottom planks 68, 69. When the pallet trolley is further moved upwards, the pallet batch is lifted from the trolley, with the lifting forks abutting the deck planks on the lowermost pallet. The first pallet batch is raised to a suitable height, so that a new pallet batch can be introduced into the receiving part of the free space 15, as illustrated in Figure 8. The lifting carriage then places the first pallet batch onto the second pallet batch, and is then moved down to its bottom position. As the lifting carriage is lowered, the lifting forks slide against the sides of the pallets under the action of their own weight, until the counterweight 58 on the line 52 again reaches the line stop 60 and the lifting forks are swung up to their release position. The

lifting carriage is then again moved upwardly from its bottom position, with the lifting forks engaging the lowermost pallet of a further pallet batch. Further pallet batches, or single pallets, can be moved into the magazine in a similar fashion.

When the desired number of pallets have been introduced into the magazine, the lifting carriage is moved to its bottom position, the lowermost pallet being placed on the two mutually parallel support beams 40 in the bottom part 17. Because of the arrangement of the support beams, the lower pallet will be located slightly above the lifting forks when the lifting carriage is in its bottom position, c.f. the left hand part of Figure 2, this being necessary in order for the lifting forks to be able to swing out of gripping engagement beneath the pallet, to the upwardly swung position. When wishing to remove a pallet from the magazine, the lifting carriage is again lifted with the aid of the guide means 51 at the beginning of the lifting movement. When the lifting carriage has reached the aforementioned gripping levels for the lifting forks, the forks are swung out and enter the space between the deck planks and bottom planks of the next lowermost pallet, and upon continued lifting movement all pallets are lifted up in the magazine, with the exception of the lowermost pallet, which can be readily removed manually or with the aid of a pallet trolley. Subsequent hereto, the pallets are again lowered onto the support beams 40, and then again lifted so that the next pallet can be removed. If it is required to remove more than one pallet simultaneously from the magazine, the line stop 60, for example, can be moved to a different position, so that a desired number of pallets are passed by the lifting forks before said forks are felled.

An example of the method for storing and handling pallets in accordance with the invention is illustrated in Figs. 6-11. Thus, as beforementioned pallets are introduced in batches into the magazine, with the pallets lying one upon the other and raised on, for example, a pallet trolley. In Figure 7 the

pallet trolley has been driven into the receiving part of the free space 15, and Figure 8 illustrates how pallets located in said space are raised with the lifting carriage, in order to prepare room for a further batch of pallets. In 5 Figure 9, the first pallet batch has been lowered onto the newly introduced pallets, and a pallet carriage is ready to move in and fetch the lowermost pallet. In this connection, firstly all pallets in the magazine are lifted, in accordance with Figure 10, with the exception of the lowermost pallet, 10 which can be removed with the aid of a pallet trolley, in accordance with Figure 11. Further features of the method are evident from the preceding description of the magazine.

It will be understood the invention is not restricted to the 15 illustrated embodiment, but that modifications can be made within the scope of the following claims. For example, the lifting forks may be replaced with hydraulic piston-cylinder devices whose pistons may be extended horizontally and which can be activated by means of suitable devices for indicating 20 the position of the lifting carriage. The illustrated embodiment, however, is to be preferred, since it operates automatically without requiring the provision of hydraulic or electrical components, which would otherwise complicate the construction and therewith render it more expensive.

Claims

1. A method for storing and handling pallets, characterized by introducing batches of pallets (16) lying horizontally one upon the other into a receiving part (65) at the lower end of a magazine which rests upon a support surface (12); by vertically lifting, prior to introducing a further pallet batch into said magazine, those pallets present in said magazine by means of a lifting arrangement (20) incorporated therein, so that the receiving part (65) of said magazine is prepared for receiving said further pallet batch; by lowering the raised pallets with the aid of said lifting arrangement (20), so that said pallets rest on the further pallet batch; and by successively removing the pallets, beginning with the lowermost pallet or pallets located nearest the support surface, the remaining pallets being lifted by the lifting arrangement (20).
2. A method according to Claim 1, characterized by introducing the pallets into said receiving part (65) while supported on a vehicle (64) which can be moved on the support surface (12).
3. A method according to Claim 2, characterized by driving the vehicle (64) at least partially into the receiving part (65).
4. A magazine for storing and handling pallets, characterized by a support frame-structure (11) having a bottom part (17) intended to be placed on a support surface (12); a free space (15) arranged in the support frame-structure for receiving and storing superposed pallets (16); a motor driven lifting arrangement (20) arranged on the supporting frame-structure and intended to co-act with pallets located in said space (15), said lifting arrangement (20) including a vertically moveable lifting carriage (21), gripping means (45) arranged on said carriage and being moveable between a

gripping and a release position, such that the lifting carriage (21) is able either to lift said pallet or to pass by said pallets when introducing further pallets into said magazine or discharging pallets therefrom.

5. A magazine according to Claim 4, characterized in that the lifting carriage (21) is of U-shape configuration and embraces said free space (15) with two lifting arms (33), on which said gripping means (45) are mounted.
6. A magazine according to Claim 4 or Claim 5, characterized by guide means (51) for guiding the gripping means (45) in dependence upon the position of the lifting carriage.
7. A magazine according to Claim 5 or Claim 6, characterized in that each gripping means (45) includes a pivotable lifting fork, which is arranged to swing about a horizontal axis (48), between an upwardly lifted and a downwardly swung position, for adopting said release and gripping positions respectively.
8. A magazine according to Claim 7, characterized in that the lifting forks (45) on each lifting arm (33) are mounted on a common, rotatable rod (46), and in that said guide means (51) is arranged to guide the angular position of the rod relative to respective lifting arms.
9. A magazine according to Claim 8, characterized in that the guide means (51) includes a line (52) or like means, arranged to pass over a line guide (53) on the supporting frame-structure (11), one end (54) of said line being connected to the rod (46); in that a line stop (60) is arranged on the supporting frame-structure to co-act with a projection (58) on the line (52); and in that the line is arranged to stretch when the projection (58) reaches the line stop (60), so as to rotate the rod (46) so that the

lifting forks (45) are located at a distance from the pallets.

10. A magazine according to Claim 9, characterized in that the lifting forks (45) are excentrically mounted on the rod (46), such that said forks are activated by their own weight in a first rotary movement directed towards the downwardly swung, gripping position; and in that the line (52) is connected to the rod (46) via a lever (56) mounted on said rod, such that the lifting forks are activated by a second rotary movement, said movement being counter directional to said first movement and exceeding said movement, when the line (52) is stopped by the line stop (60).

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Fig. 1

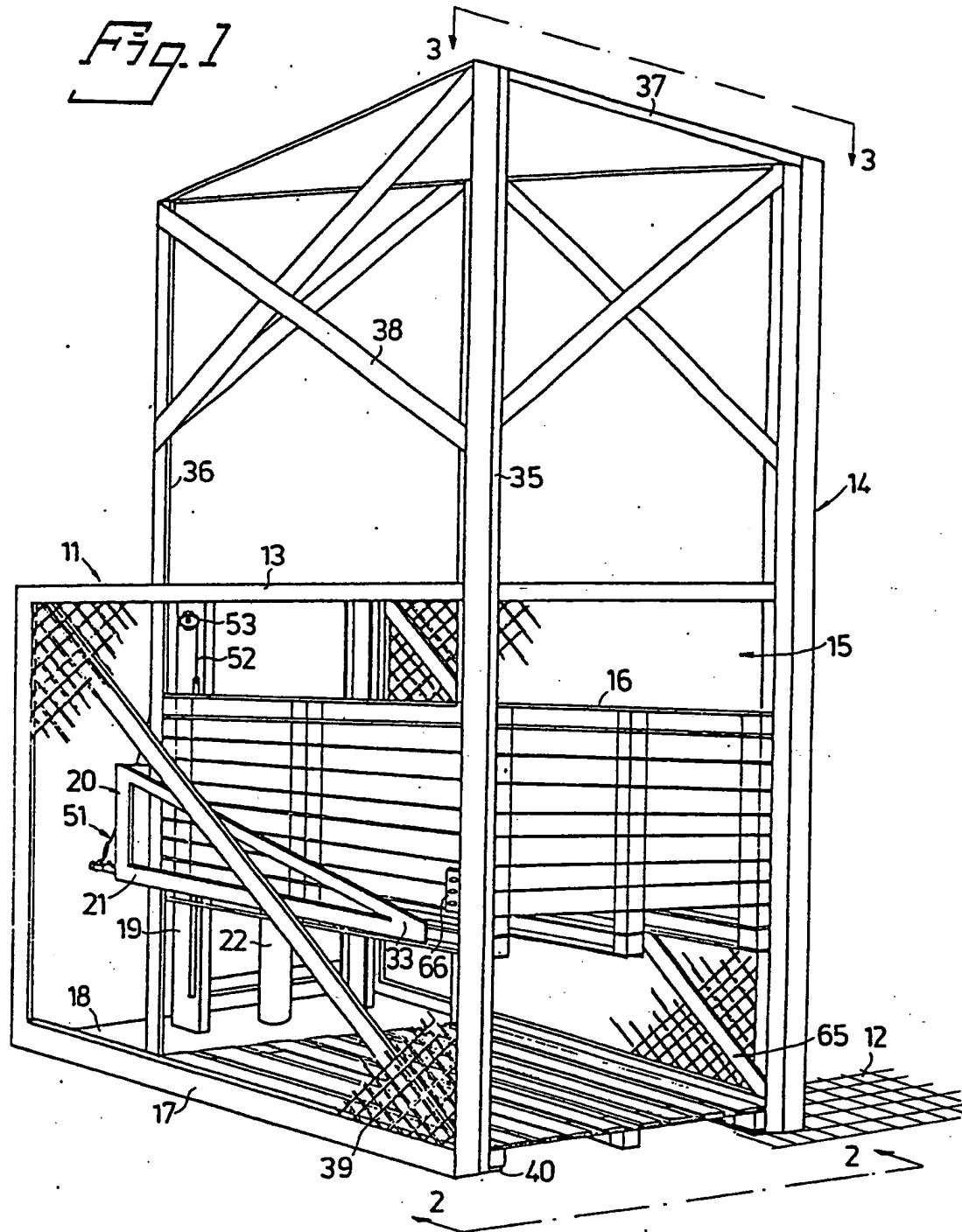


Fig. 2

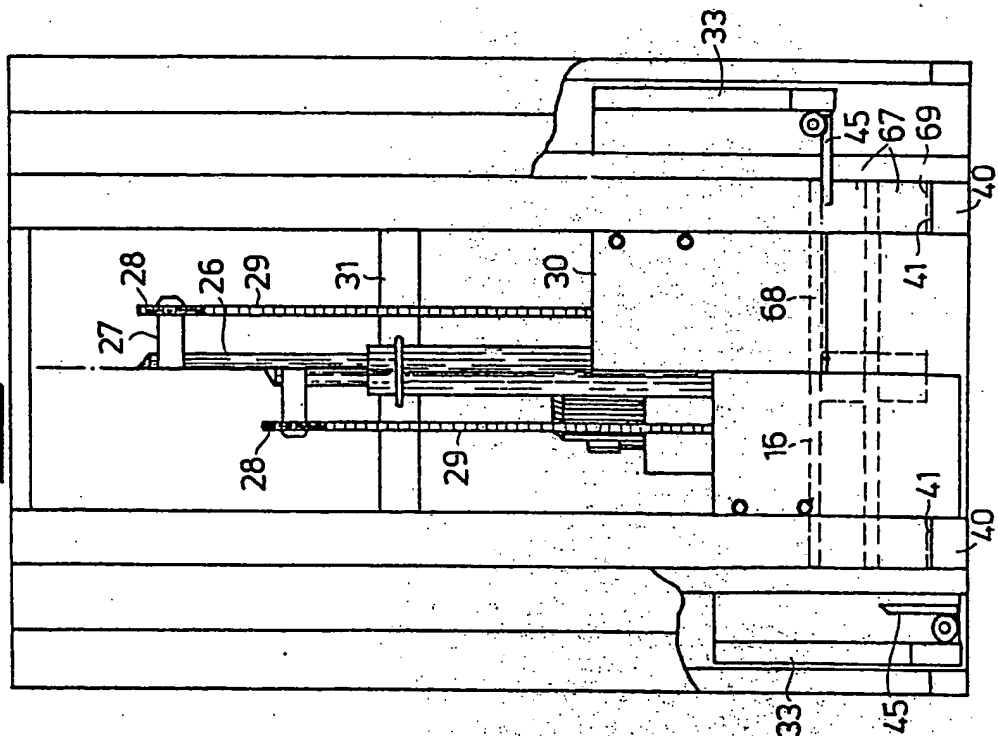


Fig. 3

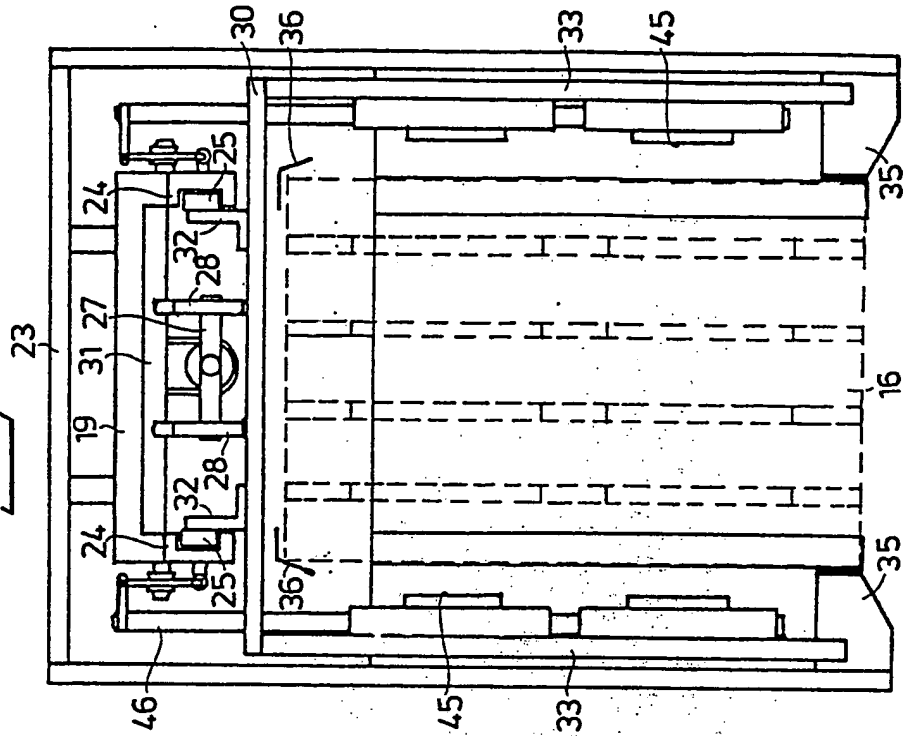


Fig. 4

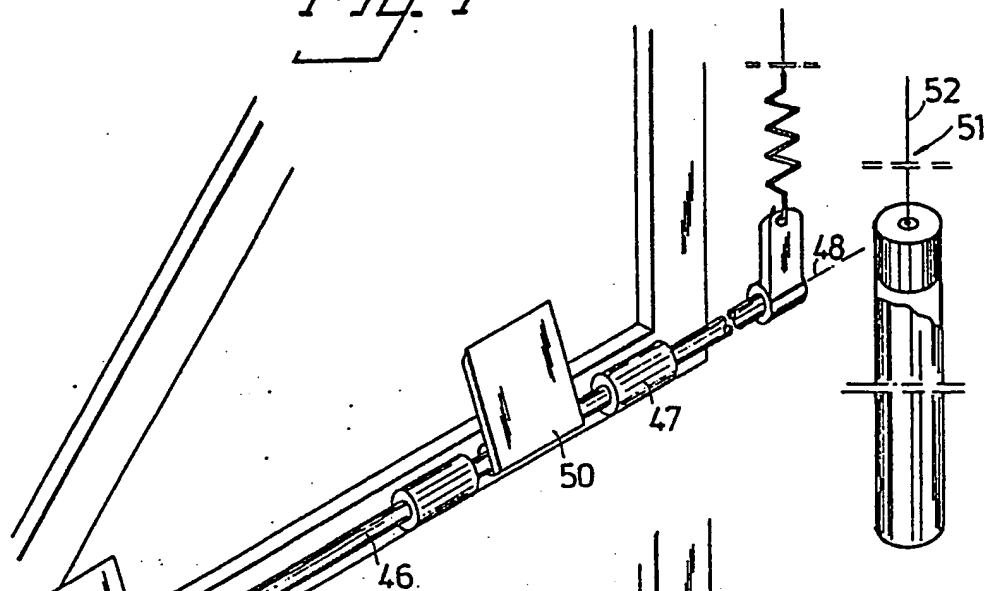


Fig. 5

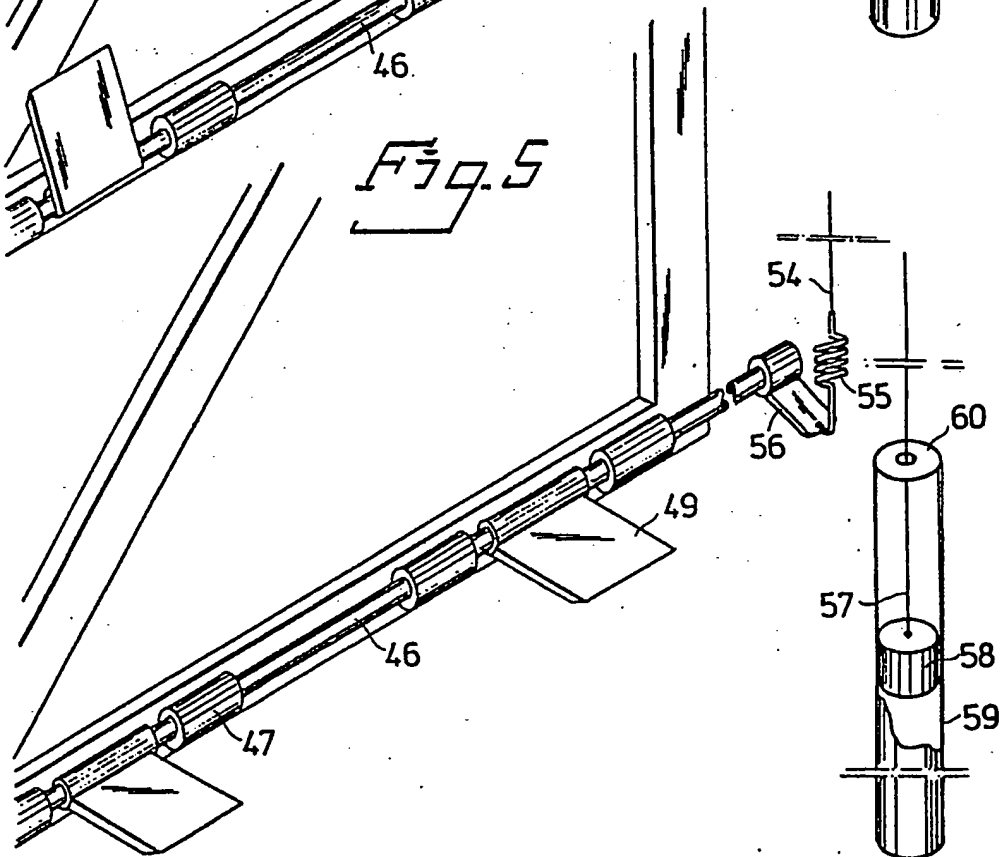


Fig. 6

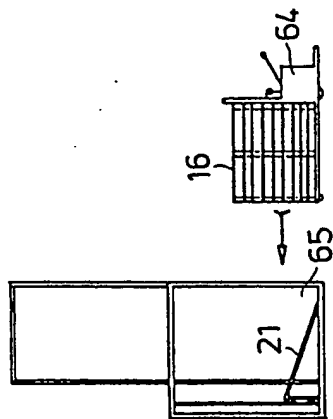


Fig. 7

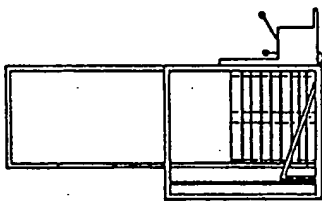


Fig. 8

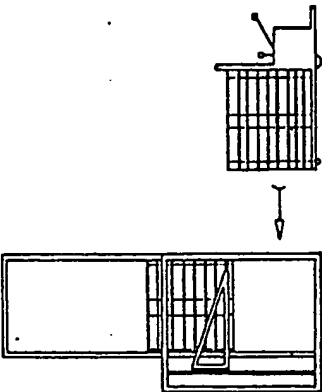


Fig. 9

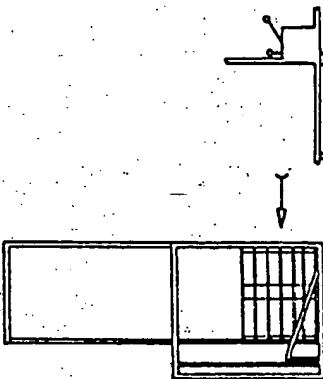


Fig. 10



Fig. 11

